cable.[30] As explained in AT&T's and MCI WorldCom's February 9, 1999 *ex parte* submission, the maximum forward-looking cost of splicing varies between 3.4 and 6.9 percent of cable investment, depending on the number of pairs in the cable, and the Commission therefore should not adopt a loading factor for splicing that exceeds the average value of 4.4 percent.[31]

The 9.4 percent figure is excessive because it is based on an NRRI study – which in turn is based on RUS data – that fails to appropriately account for the use of forward-looking splicing methods and reflects the small scale of RUS companies (*e.g.*, by focusing on small cables).[32] First, in their January 29, 1999 *ex parte* meeting with the Commission, AT&T and MCI WorldCom demonstrated and produced documentation showing that modular splicing is the most forward-looking splicing method, with typical speeds of 300 pairs or more per hour.[33] By contrast, the use of individual mechanical splicing connectors represents an inferior splicing method, with typical speeds of only 75 to 100 pairs per hour. Rather than basing its splicing study on the forward-looking methodology of modular splicing, NRRI based its study on RUS data which contained 160 observations of individual mechanical splicing and only 30 observations of modular

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[30] *See, e.g.*, AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 10 n.23 (citing BCPM2 folder, "table inputs," cell B44); *Further Notice*, ¶ 91.

[31] AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 9-10.

[32] AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 7. The Commission has recognized the need to adjust cable costs downward to reflect the buying power advantages that large Tier 1 companies enjoy. The Commission also should recognize the need to adjust cost factors downward to reflect the technological advantages that large Tier 1 companies may enjoy.

[33] The Commission has tentatively proposed a rate of 250 per hour for modular splicing. *Further Notice*, ¶ 138.

splicing, and thus was heavily weighted toward the use of an outdated and inefficient technology.[34] Second, the RUS data included few instances of cable observations in excess of 400 pairs. Indeed, 98 percent of the RUS data is for cables that are 400 pairs or less (based on sheath feet of cable). This limitation further skewed the NRRI study results because cables of 600 to 4200 pairs typically have lower ratios of splicing costs to cable materials investment than do cable observations of 6 to 400 pairs.[35] Third, the NRRI data include frequent splices that have no other purpose than to splice drop terminals into small distribution cables. In the synthesis model, these splices are already part of the installed cost of drop terminals, and thus would be double counted if included in copper cable costs.[36]

To remedy these defects and derive a splicing cost loading factor that reflects the use of forward-looking technology – as required by the Commission's *Universal Service*

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[34] The RUS data most likely show a high incidence of individual mechanical splicing because the data are somewhat dated, and because the small carriers surveyed in this study typically splice together very small cables (usually with 25 pairs). As a result, these carriers may not have set up a splicing machine to splice the small number of pairs that these cables require. Even for these small cables, however, an efficient, forward-looking carrier should use a splicing module to ensure high quality splices.

The NRRI study also makes improper use of RUS data that reflect the use of block terminal splices. For smaller distribution cables, block terminals are spliced into the cable. In the synthesis model, the cost of such splicing is included in the cost of the block terminal, and thus should not be added to the cost of the distribution cable.

[35] This lower ratio for larger pair sizes results from the fact that the fixed costs of preparing a cable for splicing can be spread more efficiently as the number of pairs increases.

[36] In addition, since the RUS data are based on more costly 24-gauge material, rather than 26-gauge material, utilizing a splicing cost as a percent of material investment improperly represents the cost of splicing 26-gauge cable, because splicing productivity is not affected by wire gauge.

Order criteria – the Commission should adopt the splicing component method advocated by AT&T and MCI WorldCom based on 250 pairs per hour. At the very least, the Commission should adopt a loading factor that is based on the use of modular splicing and that reflects an average value across all cable sizes, not just cable sizes of 400 pairs or less. As shown in AT&T's and MCI WorldCom's February 9, 1999 *ex parte* submission, such a figure should not exceed 4.4 percent.[37]

3. Estimating The Cost Of 26-Gauge Copper Cable

Although AT&T and MCI WorldCom agree with the Commission's tentative conclusion that it "should derive cost estimates for 26-gauge cable by adjusting . . . estimates for 24-gauge cable," they do not agree with the Commission's tentative decision to "estimate the ratio of the cost of 26-gauge cable to 24-gauge cable . . . using data . . . submitted by Aliant and Sprint and the BCPM default values for these costs." *Further Notice*, ¶ 86.

As explained in AT&T's and MCI WorldCom's February 9, 1999 *ex parte* submission, Dr. Gabel and the HAI sponsors agreed that the cost of 26-gauge copper should be derived by using the relative weight of copper to adjust the cost of 24-gauge copper.[38] This relative weight methodology not only has widespread support, it is the logical approach to estimating 26-gauge copper costs because such costs are directly proportional to the weight of metallic copper in the cable.[39]

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[37] AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 7-10.

[38] AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 5-6.

[39] *Id.* The reduced costs of the polyethylene cable jacket and plastic wire insulation for 26-gauge cable relative to 24-gauge cable are negligible contributors.

The BCPM sponsors' attempt to refute this showing is unavailing. Their sole claim is that the logic behind the relative weight methodology is "faulty" because, if it were true, "a 2400 pair cable [would] cost 200 X the cost of a 12 pair cable."[40] But for the cable pair sizes for which the relative weight methodology would be used, the BCPM sponsors' own data show that a 2400 pair cable costs approximately 4 times as much as a 600 pair cable, and thus fully confirm the logic of the relative weighting approach.[41] The "faulty" information before the Commission is the "actual" cost figures provided by the BCPM sponsors, which are unsubstantiated by any contract data and indicate that the cost of 26-gauge copper cable is approximately 80 percent of the cost of 24-gauge copper cable. By contrast, the relative weighting methodology shows that the cost of 26-gauge copper cable is only 65 percent of the cost of 24-gauge copper cable.[42] The BCPM sponsors have offered no credible evidence to undermine the validity of this 65 percent figure, and, indeed, their own data confirm the legitimacy of the relative weighting methodology from which it is derived.

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[40] Sprint Feb. 26, 1999 *ex parte* at 3.

[41] *Id.* (Sprint does not provide data for a 12 pair cable). Sprint's data show that a 2400 pair 24-gauge cable costs $19.14, and a 600 pair 24-gauge cable costs $4.66. *Id.* Thus, increasing the number of cable pairs by fourfold increases cable costs by approximately fourfold ($19.14/4.66 = 4.1). Similarly, Sprint's data show that a 2400 pair 26-gauge cable costs $15.33, and a 600 pair 26-gauge cable costs $3.73. *Id.* Thus, increasing the number of cable pairs by fourfold once again increases cable costs by approximately fourfold ($15.33/$3.73 = 4.1).

[42] AT&T/MCI WorldCom Feb. 9, 1999 *ex parte* at 6 (citing the AT&T Outside Plant Handbook on cable weights).

C. Buying Power Adjustments For Buried Copper And Fiber Cable

In order to reflect the superior buying power of non-rural LECs, the Commission proposed that the regression coefficient for the number of copper pairs be reduced by 15.2 percent when estimating the costs of 24-gauge aerial copper cable, and by 16.3 percent when estimating the costs of 24-gauge underground copper cable. *Further Notice*, ¶¶ 79, 82. The NRRI study did not include a recommendation for such an adjustment for buried copper cable, and the Commission tentatively concluded that, for buried copper cable, it "should use 15.2 percent, which is the lower of the reductions used for aerial and underground [copper] cable." *Id.*, ¶ 84. Similarly, the Commission proposed that the regression coefficient for the number of fiber strands be reduced by 33.8 percent when estimating the cost of aerial fiber cable, and by 27.8 percent when estimating the cost of underground fiber cable. *Id.*, ¶¶ 91, 93. The NRRI study did not make a recommendation for a buying power adjustment for buried fiber cable, and the Commission tentatively concluded that it should again use the lower of these two numbers – *i.e.*, 27.8 percent – when estimating the cost of buried fiber cable. *Id.*, ¶ 95 n.182.

AT&T and MCI WorldCom support the Commission's buying power adjustments for aerial and underground copper and fiber cable materials, but oppose the arbitrary use of the lower of the two figures for buried cable. The buying power adjustments should be set at the higher figures of 16.3 percent for buried copper cable and 33.8 percent for buried fiber cable, especially since buried cable is the predominant type of cable placed in a forward-looking construct, or, at the very least, at the average of the higher and lower values for aerial and underground cable.

D. Cable Fill Factors

AT&T and MCI WorldCom believe that the Commission's tentative fill factor determinations are too low. *See Further Notice,* ¶¶ 98-102. Distribution fill factors sufficient to provide 1.2 lines per household are more than adequate in a forward-looking cost study. As AT&T and MCI WorldCom explained in their prior comments, the cable sizing algorithm used by the Commission to determine universal service costs produces effective fill factors that are lower than the optimal values. AT&T/MCI WorldCom Dec. 17, 1997 Comments at 13. Moreover, universal service support does not include residential second lines or multiple business lines. *Id.* at 13-14. Thus, while the Commission has selected HAI fill factors for its defaults, these factors are too low for use in a model intended solely for universal service.[43] Finally, the Commission properly rejected Ameritech's argument that fill factors should be set on the basis of existing fill levels – which reflect sufficient extra capacity to permit 10 to 20 years of growth – because today's ratepayers should not have to bear the additional costs of serving tomorrow's customers. *Further Notice,* ¶ 100. *See also Platform Order,* ¶ 66 (holding that an incumbent's existing design or assets may not legitimately serve as the starting point for estimating forward-looking costs).

The feeder fill factors input values tentatively chosen by the Commission which average HAI and BCPM fills are likewise too low. Default input values for copper feeder fill are properly sized to efficiently meet current demand plus more than sufficient administrative spares. *Further Notice,* ¶ 101. Further, fiber feeder fill factors of 100 percent are appropriate because the allocation of 4 fibers per IDLC site equates to an

[43] The HAI models *both* universal service and unbundled network element demand.

actual fill factor of 50 percent, since a redundant transmit and a redundant receive fiber are included in the 4 fibers per site. In addition, fiber capacity is highly scalable by the addition of easily installed electronic equipment using the roll-over capability provided by the two redundant fibers at every site. Thus, because fiber capacity can easily be upgraded, 100 percent fill factors applied to 4 fibers per site are sufficient to meet even unexpected increases in demand and to accommodate customer churn.[44]

E. Structure Costs

1. The Failure To Include An Adjustment For Non-Rural LEC Buying Power

The Commission's proposed values for structure costs are excessive because they fail to reflect an adjustment for non-rural LEC buying power. When the Commission determined the cost of copper and fiber cable, it repeatedly recognized that the estimates in the NRRI study should be adjusted to account for the fact that non-rural LECs have greater buying power, and thus lower input costs, than the RUS companies on which the NRRI study is based. *See, e.g., Further Notice,* ¶¶ 79, 82, 84, 91, 93, 95. Despite the fact that the structure cost estimates in the NRRI study are based on the same data source as the copper and fiber cable costs, the Commission failed to propose an analogous buying power adjustment for structure costs. This oversight should be corrected, and all structure costs should be reduced by at least 16.3 percent to reflect non-rural LEC buying power.

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[44] In addition, HAI provides 100 percent redundancy of fiber to handle maintenance issues. *Further Notice,* ¶ 102.

2. The Costs Of Underground Structure

The Commission's tentatively proposed values for the costs of underground structure are excessive because they fail to exclude manhole costs from the costs of underground distribution. As AT&T and MCI WorldCom previously demonstrated, to the extent that "underground" distribution plant exists, it typically runs only a short distance (*e.g.*, from the FDI to a block terminal, or under a street when connecting two poles or two buried cable runs) and thus requires no manholes or pullboxes.[45] Indeed, the Commission's *Further Notice* recognized that manhole and pullbox costs are associated only with *feeder* plant, not *distribution* plant. *Further Notice*, ¶ 104 ("[u]nderground structure consists of trenches and conduit, and for *feeder plant*, manholes and pullboxes") (emphasis added). Thus, manhole costs should be excluded from underground distribution in the synthesis model.

If the Commission nonetheless retains manholes for copper distribution plant, it should be understood that the manhole need only accommodate one copper splice. In addition, since copper distribution cables tend to be small, the single splice also will be small. Thus, should the Commission call for distribution manholes, AT&T and MCI WorldCom recommend the use of a Polyethylene Structural Foam Buried Cable Closure, with a material cost of $215.00 (as quoted by Sue Smith, a PenCell Plastics, Inc. sales representative) and an installation cost of $220.00.[46]

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[45] HAI Inputs Portfolio (Jan. 27, 1998) at 31.

[46] *E.g.*, the PenCell PEM-2436 Buried Cable Enclosure, which is 35"W x 47"L x 24" high. *See* information at PenCell's Website at http://www.pencell.com/PEM-2436.html.

3. Distribution Plant Mix

The default values for distribution plant mix tentatively adopted by the Commission call for too much underground cable, and too little aerial cable. *See Further Notice*, ¶¶ 116-19, App. A at 4. It is critical that the Commission redress this problem because the cost of installing underground and aerial facilities varies greatly, and the relative proportions of these types of plant therefore is a prime determinant of total network costs.

The HAI sponsors believe that the HAI default values for distribution plant mix properly reflect the mix of aerial, buried, and underground cable that an efficient competitor would use in different density areas. Their research indicates that aerial cable is still the dominant form of cable structure in all density areas. As Bellcore notes, "[t]he most common cable structure is still the pole line. Buried cable is now used wherever feasible, but pole lines remain an important structure in today's environment."[47] Indeed, cable *normally* is placed on existing poles whenever they are available because buried or underground plant typically present more costly alternatives.[48] By contrast, underground cable primarily is used for *feeder* and interoffice transport, not for *distribution*.[49] Even in high density areas, "underground" distribution plant typically runs only a short distance.[50]

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[47] Bellcore, *BOC Notes on the LEC Networks* – 1994, p. 12-41.

[48] In the two densest urban zones, HAI assumes a higher proportion of both intrabuilding network cable and cable attached to the outside of buildings, and therefore increases the percentage of aerial cable in these two zones to reflect that assumption.

[49] HAI Inputs Portfolio (Jan. 27, 1998) at 31

[50] *Id.*

As a result, such distribution plant is properly classified to the aerial or buried cable account, not to the underground cable account.[51]

The HAI distribution plant mix default values correctly reflect the more extensive use of aerial distribution cable relative to underground distribution cable. Specifically, the percentage of distribution plant mix assigned to aerial cable ranges from 25 percent in low density areas to 85 percent in high density areas, and the percentage of underground cable ranges from 0 to 10 percent. The Commission's tentatively proposed values, however, range from 40 to 10 percent for aerial cable, and 0 to 90 percent for underground cable.[52] Thus, in the lowest several density zones, where underground plant likely is nonexistent, the Commission proposes non-zero amounts, and in the highest density zone, the HAI sponsors have proposed a default value for underground cable of 10 percent, but the Commission has tentatively proposed a value of 90 percent. Similarly, the HAI sponsors have proposed a default value for aerial cable of 40 percent, but the Commission has tentatively proposed a value of only 10 percent.

These large disparities cannot be squared with forward looking principles. The only company to provide separate plant mix values for distribution and feeder plant –

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[51] Part 32 plant accounts do not classify intermittent use of conduit placement as underground structure. Rather, if conduit is employed simply to bypass an obstacle or to connect together otherwise unencumbered runs of aerial or buried plant, it is booked to the aerial or buried account.

[52] If the Commission's decision is based on "Figure 12-8, Cable Construction Distribution (Not Including Bridged-Taps)" in *Bellcore Notes on the Networks* (Dec. 1997 at 12-12), its reliance on this source is misplaced. The use of the term "Distribution" on this chart refers to the distribution *network*, not distribution *cable*. Instead, it represents all copper cable pairs close to the central office, most of which are feeder cable pairs, not distribution cable pairs. *See id.* at 12-1 ("The distribution network is divided into two major parts: feeder and distribution plants.")

BellSouth – submitted data showing that the *maximum* percentage of underground distribution plant in any of its 9 states was a mere 2 percent.[53] This figure is dramatically less than the results implied by the current synthesis model assumptions.[54] Accordingly, the only available data in the record on distribution plant mix confirm that the Commission's proposed values are excessive, and that the HAI values are more than reasonable.

In addition, while AT&T and MCI WorldCom agree that a large proportion of *feeder* cable in high density zones would be in underground conduit and manholes, a high percentage of underground distribution cable could not exist in high density areas without a very large high density FDI located on streets, alleys, or on private property, or inside one building and feeding others. Because there is little outdoor real estate available for large high density FDIs, most are placed in the basement of buildings, and generally accepted practices avoid serving one building from another because building owners have concerns about security (*e.g.*, line tapping) and denial of access by the owners of other buildings.[55]

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[53] Specifically, BellSouth's response to the Commission's Universal Service Data Request issued July 9, 1997 and filed by BellSouth in September, 1997 shows the following percentages for underground distribution: Alabama, 1 percent; Florida, 2 percent; Georgia, 0 percent; Kentucky, 1 percent; Louisiana, 1 percent; Mississippi, 0 percent; North Carolina, 1 percent; South Carolina, 1 percent; Tennessee, 0 percent.

[54] For example, the underground distribution percentage calculated by the synthesis model for BellSouth-Florida is 24 percent – *i.e., 12 times* the value filed by BellSouth in response to the Commission's data request.

[55] The Commission also states that "[t]he synthesis model does not design outside plant that contains either riser cable or block cable, so we do not believe it would be appropriate to assume that there is as high a percentage of aerial plant in densely populated areas as the HAI default values assume." *Further Notice*, ¶ 119. *Proponents* of the HAI Model believe that riser cable plays the role of distribution cable in a notable (continued . . .)

F. Structure Sharing

The structure sharing percentages for aerial, buried, and underground cable tentatively adopted by the Commission assign too much structure cost to the LEC, especially in the low density zones.[56] As described in the HAI Inputs Portfolio, sharing opportunities already are widely available in all density zones and for all three types of structure, and their availability is increasing even further due to advances in technology and changes in the regulatory environment.[57] As a result, the Commission's tentatively proposed structure sharing percentages would overcompensate the LECs for their structure costs and distort the competitive marketplace.

As an initial matter, the structure sharing percentages adopted by the Commission should plainly be based on forward-looking principles, not the incumbent LECs' embedded sharing practices. *See Further Notice*, ¶ 20 (the cost model should "reflect forward-looking technology or design choices"). The degree of sharing in the incumbent

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(continued . . .)
percentage of cases in the two highest density zones. Responses to the Commission's August 1997 Data Request indicate that most large incumbent LECs provide riser cable as a regulated investment. Should the Commission continue to exclude distribution cable that is riser and block cable, then such investment should be excluded in its entirety. AT&T and MCI WorldCom believe that an appropriate structure allocation for density zone 5,000-10,000 lines per square mile should be 5 percent underground, 35 percent buried, 25 percent aerial, and 35 percent block and riser distribution cable. For greater than 10,000 lines per square mile, the structure allocation should be 10 percent underground, 5 percent buried, 20 percent aerial, and 65 percent block and riser cable.

[56] *See Further Notice*, ¶ 129 (tentatively assigning "50 percent of [aerial] structure cost in density zones 1-6 and 35 percent of the costs in density zones 7-9 to the LEC," and, for underground and buried structure, tentatively assigning "90 percent of the cost in density zones 1 and 2, 85 percent of the cost in density zone 3, 65 percent of the cost in density zones 4-6, and 55 percent of the cost in density zones 7-9 to the LEC").

[57] HAI Inputs Portfolio (Jan. 27, 1998) at App. B.

LECs' embedded network merely reflects the sharing decisions made by the incumbent LECs when they were faced with the incentives of a ratebase-regulated utility in a monopoly environment. It thus substantially understates the amount of sharing that will exist in a forward-looking, competitive market in which parties have increased incentives and opportunities to reduce costs by sharing structure.[58] On a going-forward basis, structure sharing will be promoted not only by competitive forces, but also by regulatory devices, such as the Telecommunications Act of 1996, which requires attachers to pay for two-thirds of the non-usable space on poles, ducts, conduits, and rights-of-way. 47 U.S.C. § 224(e). This two-thirds requirement shows that Congress believed at least three parties would use the incumbent LECs' outside plant structures, and thus provides for compensation on that basis. In addition, more and more municipalities are adopting similar regulations that require utilities and telecommunications companies to share their structures.[59] Further, builders often provide trenching in new subdivisions for use by cable, electric, and telephone companies to facilitate placement of wires and to minimize cable cuts.[60] In this case, the incumbent LEC pays *none* of the cost of trenching.[61]

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[58] *See, e.g.*, Florida PSC Sep. 23, 1997 Comments at 8 (there should be more sharing of structure in the future).

[59] *See, e.g.*, "Policy Relating to Grants of Location for New Conduit Network for the Provision of Commercial Telecommunications Services," Public Improvement Commission of the City of Boston (April 28, 1994); *see also* "A Nation Plugged In and Dug Up," Washington Post (July 15, 1999) at A1, A16 ("Other cities, notably San Francisco, have recently adopted ordinances encouraging companies to work together to minimize disruptions.")

[60] *See* HAI Inputs Portfolio (Jan. 27, 1998) at App. B, p. 156.

[61] *Id.*

The Commission's tentatively proposed sharing percentages for aerial cable – which assign up to 50 percent of the structure cost to the incumbent LEC – cannot be reconciled with these forward-looking realities. As AT&T and MCI WorldCom have previously explained, roughly half the space on a 40 foot pole is typically used by power companies (who need significant space for intercable separation) and the rest is used by low voltage users, including telecommunications carriers and CATV providers. Thus, when three parties (the power company, the incumbent LEC, and the CATV provider) make use of this structure, the power company uses 50 percent of the available capacity, and the incumbent LEC and the CATV provider use a maximum of 25 percent each. Accordingly, the incumbent LEC should be assigned a maximum of 25 percent of aerial costs. And, given CATV penetration rates and the fact that CATV companies generally have leased low voltage space on poles rather than install their own facilities, such three-way sharing should be found in all but the lowest density zone.

The Commission's tentatively proposed sharing percentages for buried cable – which assign up to 90 percent of the structure cost to the incumbent LEC – are likewise unsupportable. The low amount of buried cable sharing predicted by these percentages is contradicted by *ex parte* evidence showing that cable plows bury more than one cable simultaneously,[62] and by the deposition of a U S West witness in Washington State that stated, "Power is plowing in and we're going in the plow with them."[63] It also ignores evidence that builders often facilitate the placement of wires and minimize the costs of

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[62] *See* MCI WorldCom Sept. 18, 1997 *ex parte*.

[63] *See* Deposition of Genie Cervarich at 41. *Pricing Proceeding for Interconnection, Unbundled Elements, Transportation and Termination, and Resale*, Docket Nos. UT-960369, UT-960370, and UT-960371 (Apr. 18, 1997).

cable cuts by providing trenching in new subdivisions – free of charge – to cable, electric, and telephone companies.[64] And it ignores the statement by Anchorage Telephone Utility that it shares trench space with two local electric companies.[65] In light of this record evidence, there is no reasonable basis for the Commission to conclude that LECs can share only a small fraction of buried structure costs with other users.

Finally, the Commission's tentatively proposed sharing percentages for underground cable – which assign up to 90 percent of the structure cost to the LEC – are also unsustainable. In most cases, underground cable is the most expensive type of investment per foot of structure, and, for this reason alone, presents users with the *greatest* incentives for sharing its costs. The costs of obtaining the necessary permits and digging up and repairing streets are so high that efficient competitors will attempt to share these costs with other parties, and will be able to do so in most instances because increased competition will multiply the number of parties seeking to share structure.[66] In addition, as described above, some municipalities have adopted ordinances encouraging companies to work together to minimize disruptions. Thus, not surprisingly, major cities such as New York, Boston, and Chicago already are experiencing increasing instances of conduit sharing, and one conduit owner in New York already has over 30

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[64] *See* HAI Inputs Portfolio (Aug. 1, 1997) at 16; *id.* at Appendix B, pp. 131-132.

[65] *See Anchorage Telephone Utility's Request for Partial Waiver of Data Submission*, CC Docket No. 96-45 (Aug. 8, 1997). Anchorage states that it is billed for 45 percent of the trenches.

[66] Indeed, the decision of a utility to place expensive underground conduit frequently is driven by the expectation that this extra cost will be recouped through increased opportunity to lease ducts to other users.

telecommunications providers sharing its structure.[67] In light of this evidence, the Commission cannot reasonably conclude that efficient LEC's only will be able to share as little as 10 percent of their underground structure on a going-forward basis.

G. Digital Loop Carrier Costs

The DLC costs tentatively adopted by the Commission significantly overstate the actual costs of DLC equipment. These costs are inflated because they are derived from incumbent LEC data that supposedly are "based on actual costs incurred in purchasing DLCs," *Further Notice*, ¶ 144, but which in fact are totally unsupported by any such verifiable evidence and, indeed, are flatly refuted by the very contract information proffered by the incumbent LECs.

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[67] HAI Inputs Portfolio (Jan. 27, 1998) at App. B, p. 156-57.

[68] Specifically, AT&T and MCI WorldCom investigated the DLC cost submissions of Ameritech, Bell Atlantic, BellSouth, GTE, Aliant, and Sprint.

[69] Marconi Communications was previously known as RELTEC Corporation.

[70] *See* Exhibit B; *see also, e.g.,* Agreement No. PR-7246-B, Amendment #2, Appendix B, Page 2 of 9 (July 31, 1994).

[71]

[72] Indeed, some incumbent LECs (*e.g.*, GTE and Aliant) have proposed DLC costs that are so exorbitant they are economically inconsistent with observed incumbent LEC practices of choosing to provision loop feeder on DLC when feeder lengths exceed 9 to 12 kilofeet.

[***END

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III. SWITCHING AND INTEROFFICE FACILITIES

A. Switch Costs

1. Switch Cost Data

HAI switch input values provide the best available estimates for forward-looking switch costs. Contrary to the Commission's suggestion in the *Further Notice* (¶ 152), the proposed HAI switch input values have been reinforced by a variety of sources, including public information submitted by incumbent LECs in state proceedings and to this Commission, and public cost information issued by switch manufacturers. *See* AT&T Jan. 7, 1999 *ex parte*; AT&T Apr. 22, 1999 *ex parte*. Indeed, these sources confirm per line switch costs that in many instances are *lower* than the HAI default values. For example, the incumbent LECs' witness, Jerry Hausman, testified before the California PSC that "the prices of new . . . switches are in the *$70 per line or lower* range" *See* AT&T Jan. 7 1999 *ex parte* (emphasis added) (excerpting testimony). And in the Commission's Bell Atlantic-NYNEX merger proceeding, a Bell Atlantic witness whose responsibilities include "planning and engineering Bell Atlantic central office switches" affirmed that Bell Atlantic could "install a new Lucent 5ESS switch" with 60,000 lines for "total costs of the hardware and software . . . as low as *$55 to $60 per line*." *See* Declaration of Nancy Sayer on behalf of Bell Atlantic, In re NYNEX corp. and Bell Atlantic Corp. Application for Consent to Transfer of Control, Tracking No. 960205, 960221, (Oct. 22, 1996) at ¶¶ 1, 11 (emphasis added) ("Sayer Declaration").

These figures show that HAI switching input values are *conservative*, and that the Commission is fully justified in relying on them as the most accurate indicator of

forward-looking switching costs. As AT&T and MCI WorldCom have explained, *see* AT&T Oct. 17, 1997 Comments at 15-16, the HAI input values are drawn from a broad range of companies in diverse geographic regions, and thus are more likely to accurately model the current price levels that LECs pay for switches.

For similar reasons, AT&T and MCI WorldCom are concerned that the data on switch costs provided by Gabel/Kennedy must be adjusted for time trends in order to model efficient forward-looking costs. *See Further Notice*, ¶¶ 166-68. As the Commission's own description notes, those data are largely based upon prices for switches "installed between 1983 and 1995," *id.* at App. E-1, and thus reflect prices that are out-of-date and based on older technology and embedded switch deployment architecture. As the incumbent LECs' trade association conceded recently in another proceeding, "[c]osts [for central office switches] have been driven down rapidly by advances in digital technology. On a per-line basis, prices declined over 60 percent from 1986 to 1996 and were projected to fall another 12 percent by 2000." USTA Comments, CC Docket 96-98 (May 26, 1999), "UNE Fact Report," by Peter W. Huber & Evan T. Leo, at I-28 (citing, *inter alia*, Northern Business Information, *U.S. Central Office Equipment Market: 1996 Database, Version 1.0* at 27 (Jan. 1997) (source of HAI switch input values)); *see* GTE Comments, CC Docket 96-98, (May 26, 1999) at 45 (same). Because the Commission's depreciation data, in particular, rely heavily on older switches, it is critical that the Commission also examine more current price structures like those found in forward-looking vendor contracts. *See* AT&T Apr. 22, 1999 *ex parte*. As AT&T and MCI WorldCom have documented, *see id.*, those contracts demonstrate that the Gabel/Kennedy data significantly overstate switch costs.

If the Commission nonetheless chooses to rely on this historical price information, AT&T and MCI WorldCom agree with the Commission that the Gabel/Kennedy depreciation data and the RUS data should be melded (so long as appropriate adjustments are made to the RUS data, *see infra*), because the RUS data are the only information on the cost of switches with less than 1,000 lines. *See Further Notice*, ¶ 162. It should be noted, however, that given the extremely small size of the RUS carriers, one would expect that the discount they receive in purchasing switches would be significantly smaller than that of the non-rural companies for which the synthesis model is intended.

Notwithstanding their limitations, the combined Gabel/Kennedy RUS data are superior to the 1997 Data Request submissions and the incumbent LECs' proffered Workshop data. *See Further Notice*, ¶¶ 155-56. The latter sets of data are less reliable since they are drawn from fewer companies. The Workshop data, in particular, as AT&T and MCI WorldCom have previously explained, *see* AT&T Mar. 10, 1999 *ex parte*, are unreliable (drawing from only three companies), contain numerous inconsistencies, rely on historical and embedded costs, and were modified using undocumented and unexplained methods.[73]

2. Adjustments To The Data

If the depreciation and RUS data are to be used, then AT&T and MCI WorldCom agree with the Commission that the RUS data must be modified to account for the costs

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[73] For example, BellSouth made modifications to these data to "estimate" and remove ISDN costs. *See* BellSouth Jan. 29, 1999 *ex parte*. But BellSouth provided no information in any public or proprietary data submissions that would enable another party to review and verify any of these "estimations" or the resulting switch investment modifications. Because it is impossible on the current record to determine whether such adjustments were appropriate or accurate, the Commission should not rely on these data.

of the main distribution frame ("MDF") equipment, power, and telephone company engineering to make them consistent with the depreciation data that include these costs. *See Further Notice*, ¶ 157. AT&T and MCI WorldCom also agree with the Commission that $12 per line is a reasonable figure for MDF-associated costs involving copper feeder loop terminations. *See Further Notice*, ¶ 158; AT&T Jan. 7 1999 *ex parte* at 2 n.1.

AT&T and MCI WorldCom do not agree with the Commission, however, that the 8 percent engineering adjustment should be applied to power costs. S*ee Further Notice*, ¶ 161. Costs for power investment already include the labor costs for installation. Thus, while the Commission should apply the engineering adjustment to switch investment, it should not apply the adjustment to power estimates.[74] Furthermore, the proposed adjustments for power costs (*id.* ¶ 159) are substantially higher than HAI proposed inputs, and should be reduced.[75]

3. Accounting For Changes In Cost Over Time

Given the undisputed and significant decreases in switch prices over the last several years, *see supra*, AT&T and MCI WorldCom agree with the Commission's proposal to restate older switch prices contained in the data set into 1997 terms. *See Further Notice*, ¶¶ 166, 168. Specifically, AT&T and MCI WorldCom agree with the Commission's proposal to adjust the regression forms to account for the technological

[74] The Commission also proposes to add $27,598 as the average cost of terminating a remote on a host switch. *Further Notice*, ¶ 160. The documentation relied on for that figure in the NRRI study is unclear. For example, that figure may include certain equipment costs associated with the circuit facilities that already have been included in the model within the costs of interoffice transport. The Commission therefore should forego this addition until more detail is provided and the figure can be verified.

[75] See AT&T Jan. 7, 1999 *ex parte* at 2 n.1.

improvements reflected in forward-looking switch costs. *Id.* The Commission also is correct in rejecting Ameritech's and GTE's proposal to rely on the Turner Price Index to accomplish this necessary adjustment. As one incumbent LEC has conceded, that index simply is not intended to account for "technology changes or productivity improvements." *See* AT&T Jan. 7, 1999 *ex parte* at 5 (quoting BellSouth USF Responses to FCC Staff Questions of June 25, 1998, Question 2, page 1 of 2 (filed Aug. 7, 1998)). It also is inappropriate to use the Commission's suggested reciprocal functional form for the effects of time, rather than the standard logarithmic functional form.[76]

No adjustments to the switch input values currently are needed to account for the possible "increased use of packet switches." *See Further Notice*, ¶ 169. Although packet switches are anticipated to result in substantially lower costs for switching of voice-grade services at some point in the future, those switches have not yet proven technically capable of providing the full range of voice-grade services on the scale that circuit switches provide, and are not widely used for those types of services today. Accordingly, it is now too early and speculative to attempt to model the "potential impact" (*Further Notice*, ¶ 169) of packet switches, and the Commission should reserve the question for future models.

4. Switch Cost Estimates

The Commission proposes to adopt a fixed cost of $186,400 for remote switches, a fixed cost of $447,000 for host or stand-alone switches, and variable costs of $83 per line for all switch types. *Further Notice*, ¶ 173. While AT&T and MCI WorldCom agree

[76] *See* AT&T March 30, 1999 *ex parte*.

that it is appropriate to adopt the same per-line variable costs for all switch types, they believe that each of the proposed inputs is significantly overstated. Not only are the proposed figures higher than most of the public data that AT&T has provided in its *ex parte* filings, they also are higher than estimates provided by many of the incumbent LECs. Thus, while Bell Atlantic's employee responsible for switch planning advocated costs of about $55 to $60 per line, the Commission's proposed figures, even after making the necessary adjustments for MDF, installation, and power, are $81 per line for a 20,000 line host/stand-alone switch and $130 per line for a 2,000 line remote switch.[77] Because the publicly available data from the most current sources – most notably forward-looking prices from vendor contracts – contain much lower figures for switch costs, the Commission should modify its proposed figures to conform with these sources.[78]

B. Other Switching And Interoffice Transport

AT&T and MCI WorldCom agree with the Commission that if it relies upon the depreciation and RUS data, those data, once appropriately adjusted, include all relevant costs to make the switch functional. *See Further Notice*, ¶ 178. Therefore, the Commission correctly proposed to set the MDF/Protector investment per line and power input values at zero and the Switch Installation Multiplier at 1.0. *Id.*

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[77] The calculation for the host/stand-alone is: $447,000/20,000 lines + $83 = $105 per line total cost. Adjusting for installation (removing 8 percent = $8), MDF costs ($12 less per line), and power ($74,500/20,000 = $4) results in $81 per line in total costs. The calculation for the remote switch is: $186,000/2,000 lines + $83 = $176 per line total cost. Adjusting for installation (removing 8 percent = $14), MDF costs ($12 less per line), and power ($40,000/2,000 = $20) equals $130 per line in total costs.

[78] A further reason why the Commission's proposed switch costs exceed incumbent LEC stated costs is because the latter incorporate the substantial switch cost savings the incumbent LEC enjoys from its use of IDLC.

AT&T and MCI WorldCom disagree with the *Further Notice's* proposal (¶¶ 179-81) to set the analog line circuit offset for digital lines to zero. Based upon a review of ARMIS data, *see* ARMIS Infrastructure Report 43-07 (identifying digital lines served via copper and fiber), the Commission's proposed data set assumes that that the percent of total working lines that are served by DLCs is 18.3 percent.[79] Moreover, because a substantial portion of these embedded DLC lines are likely universal DLC ("UDLC"), not IDLC, the Commission's assumed penetration is even less. That figure is too low to be consistent with forward-looking cost principles. *See* AT&T Jan. 7, 1999 *ex parte* at 5-6. The latest runs of the synthesis model for the non-rural study areas produce percentages for DLC penetration ranging from 2 to 69 percent, with an average value of 40 percent. Indeed, because an efficient, forward-looking network would rely more heavily upon IDLC, the Commission's data must include an adjustment to account for the lower costs of IDLC lines versus analog lines or versus UDLC lines.[80]

The only question, therefore, is the appropriate amount of that adjustment. At a bare minimum, that adjustment must account for the undisputed fact that IDLC lines do not require an MDF to terminate at the switch. As a result, the $12.00 MDF investment used for analog lines should be removed for all IDLC lines. In addition, as Bell

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[79] This is the lines weighted DLC penetration for the companies that are included in the depreciation data set as reflected in their 1998 ARMIS 43-07 report. This estimate was made using switches less than four years older than the filing date. The average nationwide 1998 DLC penetration is approximately 17 percent, compared to the 18.3 percent calculated for the depreciation data set companies for 1998.

[80] AT&T's and MCI WorldCom's figures assume that all DLC in the ARMIS infrastructure report, including UDLC, is IDLC – the only type of DLC that is forward-looking for universal service purposes. As a result, AT&T's and MCI WorldCom's figures *overcompensate* the incumbent LECs by overstating actual IDLC penetration by approximately 50 percent.